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# Fertilizer Guide for Commercial Vegetable Growers

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN • COLLEGE OF AGRICULTURE • COOPERATIVE EXTENSION SERVICE  
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COMMERCIAL VEGETABLE PRODUCERS depend on chemical fertilizers to supply the nutrients required by their crops. Although many Illinois soils are naturally high in fertility, it is doubtful whether intensive cropping of vegetables could be achieved without adding fertilizer. In fact, many growers have fertilized excessively, resulting in large residual amounts of phosphorus, potassium, calcium, and magnesium in the soil. Although this residual fertility may not be detrimental, applying unneeded fertilizer raises costs without increasing production, thus reducing profits.

As production costs climb, growers find that they are operating with reduced profit margins. Only efficient producers can survive in today's economy. By testing your soil and applying only as much fertilizer as is needed you can save a significant amount of money. Using fertilizer efficiently provides greater profit and minimizes the release of potential pollutants into the environment.

## Testing Your Soil

To determine how much of each nutrient must be added for optimum crop production, collect soil samples every 2 or 3 years and have them analyzed for pH and for phosphorus and potassium concentrations. The test results and your knowledge of the field's cropping and fertilization history will provide the information you need to develop a fertilization plan for the crop to be grown.

Samples should be collected in the late fall when the soil is relatively dry but not yet frozen. Separate samples should be tested for every field that differs in color, slope, drainage, or previous fertilization and cropping. Each sample should represent no more than 4 acres and should consist of several subsamples collected at random locations throughout the field. Check with your soil testing laboratory for more specific instructions.

## Determining Fertilizer Application Rates

The soil test results will be reported in terms of the amount of elemental phosphorus (P) and elemental potas-

sium (K) per acre. Referring to Table 1, determine which of the four soil fertility groups (A through D) your soil's phosphorus test level fits into. Then do the same for the potassium test level. These groups can then be used in conjunction with Table 2 to determine how much of the two nutrients you should add for the crop you plan to grow.

Locate the crop in Table 2, and then find the column under the phosphorus heading that corresponds to your soil's fertility group for phosphorus. The numbers in the column below the fertility group will tell you how many pounds of  $P_2O_5$  you need to apply per acre to increase the phosphorus content to a satisfactory level. Follow the same procedure using the numbers in the potassium column to determine how much  $K_2O$  you should apply. If soil test results are not available, use the amounts of phosphorus and potassium recommended for fertility group B.

Since soil tests for nitrogen are of little value, the nitrogen recommendations in Table 2 are based on the needs of the various crops, but in developing a fertilization program you should also take into account the field's cropping history and the type of soil.

If the crop grown in the field during the previous year was a legume (soybeans or alfalfa), the amount of nitrogen applied can be 25 to 30 pounds per acre less than that recommended in Table 2. The nitrogen status of most vegetable crops can be determined by the color of the foliage. A pale green or slightly yellow color may indicate a need to apply additional nitrogen.

Unless otherwise indicated, the fertilizer recommendations given in this circular are for the mineral soils that predominate in Illinois. Vegetable crops grown on sandy soils usually require greater amounts of nitrogen and potassium. Splitting the nitrogen fertilizer between two separate applications will result in greater efficiency and production on sandy soils that are irrigated or that receive heavy rainfall.

Plantings made early in the season in cool, wet soils may respond well to the application of band-placed phosphorus

Table 1. Soil Fertility Groups for Phosphorus and Potassium

Nutrient	Fertility group			
	A	B	C	D
	<i>pounds per acre</i>			
Bray $P_1$ phosphorus (P)	0-25	26-50	51-75	Above 75
Potassium (K)	0-100	101-250	251-350	Above 350

one crop may be undesirably low for another. For assistance, consult *Horticulture Facts* No. VC-7-80, "Fertilizer Guide for Market Gardeners," available from your county Cooperative Extension Service adviser or from the Department of Horticulture, 124 Mumford Hall, University of Illinois, Urbana, Illinois 61801.

When more than one crop is to be grown in a field it is necessary to adjust the fertilizer application rates so that the nutrients needed by all of the crops are supplied. Tailoring a fertilizer program for such situations is difficult because the amount of a nutrient that is considered adequate for

### Recommended application rate based on soil tests

Crop	Nitrogen (N)	Phosphorus (P <sub>2</sub> O <sub>5</sub> )				Potassium (K <sub>2</sub> O)				Suggested application method
		Fertility group				Fertility group				
		A	B	C	D	A	B	C	D	
<b>ASPARAGUS</b>										
		<i>pounds per acre</i>								
Nursery beds	50	200	100	50	25	200	100	50	25	Broadcast and disk
New plantings	0	150	50	25	0	150	50	25	0	Broadcast and plow down
	50	50	50	25	25	50	50	25	25	Side-dress at first cultivation
Total	50	200	100	50	25	200	100	50	25	
Cutting beds										
Nonhybrids	50	150	100	50	25	200	150	100	50	Broadcast and disk
Hybrids	75	200	150	100	50	300	225	150	75	Broadcast and disk
In sandy soils an additional 50 pounds of nitrogen per acre can be applied as a sidedress after cutting. In new beds build up organic matter with cover crops and manure 1 or 2 years before planting crowns.										
<b>BEANS</b>										
Lima	20	150	100	50	0	150	100	50	0	Broadcast and plow down
	40	40	40	20	20	40	40	20	20	Band 2 in. X 2 in. at seeding
Total	60	190	140	70	20	190	140	70	20	
Snap	0	150	100	50	0	100	50	25	0	Broadcast and plow down
	40	40	40	20	20	40	40	20	20	Band 2 in. X 2 in. at seeding
Total	40	190	140	70	20	140	90	45	20	
Snap, second crop	30	20	20	20	20	40	40	20	20	Band 2 in. X 2 in. at seeding
In sandy soils an additional 25 pounds of nitrogen per acre can be applied as a sidedress when two or three true leaves have appeared. If the soil pH is greater than 6.7, apply 5 pounds of zinc and 3 pounds of manganese per acre at planting.										
<b>BEEETS</b>										
	75	150	100	50	25	200	150	100	50	Broadcast and disk
	50	0	0	0	0	0	0	0	0	Side-dress 4 to 6 weeks after planting
Total	125	150	100	50	25	200	150	100	50	
Apply 3 pounds of boron per acre on clay loams and 1 pound per acre on sandy soils.										
<b>BROCCOLI AND CAULIFLOWER</b>										
	100	200	150	75	50	200	150	75	50	Broadcast and disk
	50	0	0	0	0	0	0	0	0	Side-dress 2 to 3 weeks after trans-planting
	50	0	0	0	0	0	0	0	0	Side-dress 5 to 6 weeks after trans-planting if required
Total	200	200	150	75	50	200	150	75	50	
Apply 2 pounds of boron per acre on clay loams and 1 pound per acre on sandy soils if the pH is greater than 6.7. Early plantings in cold soil may respond well to a high-phosphorus starter solution.										
<b>CABBAGE, COLLARDS, AND KALE</b>										
	75	150	100	50	25	150	100	50	25	Broadcast and disk
	50	0	0	0	0	0	0	0	0	Side-dress 4 weeks after planting
Total	125	150	100	50	25	150	100	50	25	
Early plantings in cold soil may respond well to a high-phosphorus starter solution.										
<b>CARROTS</b>										
	50	150	100	50	25	200	150	100	50	Broadcast and disk
	30	0	0	0	0	0	0	0	0	Side-dress 4 weeks after seeding
Total	80	150	100	50	25	200	150	100	50	
In sandy soils an additional 30 pounds of nitrogen per acre may be applied as a sidedress between 7 and 8 weeks after seeding.										



**TABLE 2. FERTILIZER RECOMMENDATIONS FOR VEGETABLE CROPS (continued)**

Recommended application rate based on soil tests										
Crop	Nitrogen (N)	Phosphorus (P <sub>2</sub> O <sub>5</sub> )				Potassium (K <sub>2</sub> O)				Suggested application method
		Fertility group				Fertility group				
		A	B	C	D	A	B	C	D	
<i>pounds per acre</i>										
CELERY	100	250	200	150	100	300	200	100	50	Broadcast and disk
	25	0	0	0	0	0	0	0	0	Side-dress 4 weeks after planting
	25	0	0	0	0	0	0	0	0	Side-dress 8 weeks after planting
	Total 150	250	200	150	100	300	200	100	50	
Because celery has a high moisture requirement, irrigation is essential for commercial production. Use of a starter solution is recommended when transplanting celery.										
CUCUMBERS	50	100	50	0	0	150	100	50	0	Broadcast and plow down
	25	50	50	50	25	50	50	50	50	Band 2 in. × 2 in. at seeding
	25	0	0	0	0	0	0	0	0	Side-dress when vines start to run
	Total 100	150	100	50	25	200	150	100	50	
EGGPLANT	75	200	150	100	50	250	150	100	50	Broadcast and disk
	25	0	0	0	0	0	0	0	0	Side-dress 4 weeks after planting
	25	0	0	0	0	0	0	0	0	Side-dress 8 weeks after planting
	Total 125	200	150	100	50	250	150	100	50	
Use of a starter solution is recommended when transplanting eggplant.										
HORSERADISH	150	250	200	100	50	250	200	100	50	Broadcast and disk
LETTUCE (LEAF), EN- DIVE, AND ESCAROLE	80	200	100	50	25	200	100	50	25	Broadcast and disk
	40	0	0	0	0	0	0	0	0	Side-dress 3 to 5 weeks after planting
	Total 120	200	100	50	25	200	100	50	25	
Apply only 75 pounds of nitrogen per acre to head lettuce because excessive nitrogen may result in loose heads.										
MUSKMELON	50	150	100	50	0	150	100	50	0	Broadcast and plow down
	25	50	50	50	50	50	50	50	50	Band 2 in. × 2 in. at seeding
	25	0	0	0	0	0	0	0	0	Side-dress when vines start to run
	Total 100	200	150	100	50	200	150	100	50	
The use of black plastic mulch reduces leaching and may therefore make nitrogen sidedressings unnecessary on mineral soils.										
ONIONS	75	200	100	50	25	200	100	50	25	Broadcast and disk
	25	0	0	0	0	0	0	0	0	Side-dress 4 to 5 weeks after planting
	Total 100	200	100	50	25	200	100	50	25	
For green onions an additional 25 pounds of nitrogen per acre can be applied as a sidedress from 4 to 5 weeks before harvest.										
PARSLEY	75	200	150	100	50	200	150	100	50	Broadcast and disk
	25	0	0	0	0	0	0	0	0	Side-dress at each cutting
	Total 100	200	150	100	50	200	150	100	50	
PEAS	0	100	50	25	0	100	75	50	25	Broadcast and disk
	50	50	50	50	50	50	25	25	25	Band 2 in. × 2 in. at seeding
	Total 50	150	100	75	50	150	100	75	50	
After periods of heavy rains in the spring an additional 30 pounds of nitrogen per acre can be applied when peas are 4 to 6 inches tall. Apply only when the plants are dry to avoid burning the foliage.										
PEPPERS	75	200	150	100	50	250	150	100	50	Broadcast and disk
	50	0	0	0	0	0	0	0	0	Side-dress after first fruit set
	Total 125	200	150	100	50	250	150	100	50	
In sandy soils an additional 25 pounds of nitrogen may be applied as a sidedress after the first harvest. The use of a starter solution is recommended when transplanting peppers.										
POTATOES	0	150	100	0	0	200	150	100	50	Broadcast and disk
	100	100	100	100	100	100	100	100	50	Band-place at planting
	50	0	0	0	0	0	0	0	0	Side-dress at emergence
	Total 150	250	200	100	100	300	250	200	100	
In sandy soils an additional 30 pounds of nitrogen can be applied as a sidedress before the plants are about 8 or 10 inches tall. On soils with magnesium test values less than 250 pounds per acre, apply 50 pounds of magnesium per acre at planting.										



TABLE 2. FERTILIZER RECOMMENDATIONS FOR VEGETABLE CROPS (continued)

Recommended application rate based on soil tests										
Crop	Nitrogen (N)	Phosphorus (P <sub>2</sub> O <sub>5</sub> )				Potassium (K <sub>2</sub> O)				Suggested application method
		Fertility group				Fertility group				
		A	B	C	D	A	B	C	D	
<i>pounds per acre</i>										
PUMPKINS	75	150	100	50	25	250	200	150	100	Broadcast and disk
	25	0	0	0	0	0	0	0	0	Side-dress when vines start to run
	Total 100	150	100	50	25	250	200	150	100	
Excessive use of nitrogen may result in thin walls and a flat side.										
RHUBARB										
New plantings	50	250	200	150	100	250	200	150	50	Broadcast and plow down
	50	0	0	0	0	0	0	0	0	Side-dress around each hill 2 weeks after growth starts
	Total 100	250	200	150	100	250	200	150	50	
Cutting beds	50	200	150	100	50	250	150	100	50	Side-dress each hill in early spring
	50	0	0	0	0	0	0	0	0	Side-dress at first harvest
	50	50	50	50	50	50	50	50	50	Side-dress at last harvest
	Total 150	250	200	150	100	300	200	150	100	
SPINACH	100	200	150	100	50	200	150	100	50	Broadcast and disk
	20	0	0	0	0	0	0	0	0	Side-dress 4 to 5 weeks after planting
	Total 120	200	150	100	50	200	150	100	50	
SQUASH	75	150	100	50	25	200	100	50	25	Broadcast and disk
	25	0	0	0	0	0	0	0	0	Side-dress when vines start to run
	Total 100	150	100	50	25	200	100	50	25	
SWEET CORN	100	150	100	75	50	150	100	75	50	Broadcast and disk
	30	0	0	0	0	0	0	0	0	Side-dress when corn is 12 in. tall
	Total 130	150	100	75	50	150	100	75	50	
TOMATOES — Fresh Market										
On sandy soils	100	250	200	100	50	300	200	100	50	Broadcast and plow down
	25	0	0	0	0	0	0	0	0	Side-dress at first cultivation
	25	0	0	0	0	0	0	0	0	Side-dress after first fruit set
	Total 150	250	200	100	50	300	200	100	50	
On loams	75	250	200	100	50	300	200	100	50	Broadcast and plow down
	25	0	0	0	0	0	0	0	0	Side-dress at first cultivation
	25	0	0	0	0	0	0	0	0	Side-dress after first fruit set
	Total 125	250	200	100	50	300	200	100	50	
The second sidedress may not be required on early or semideterminate tomatoes. The use of a starter solution is recommended when transplanting tomatoes.										
WATERMELONS	50	150	100	50	0	150	100	50	0	Broadcast and plow down
	25	50	50	50	50	50	50	50	50	Band 2 in. × 2 in. at seeding
	25	0	0	0	0	0	0	0	0	Side-dress when vines start to run
	Total 100	200	150	100	50	200	150	100	50	
The use of black plastic mulch reduces leaching and may therefore make nitrogen sidedressings unnecessary on mineral soils.										

This circular was prepared by John M. Gerber, Extension Specialist in Vegetable Crops, and John M. Swiader, Assistant Professor of Horticulture, University of Illinois at Urbana-Champaign.

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